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30 Priority : 31.07.92 US 922900	72 Inventor : Drerup, Bernard Charles 4711 Spicewood Springs Road, No.258 Austin, Texas 78759 (US)
43 Date of publication of application : 02.02.94 Bulletin 94/05	74 Representative : Moss, Robert Douglas IBM United Kingdom Limited Intellectual Property Department Hursley Park Winchester Hampshire SO21 2JN (GB)
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71 Applicant : International Business Machines Corporation Old Orchard Road Armonk, N.Y. 10504 (US)	

54 **System and method of data transfer.**

57 A system and method are provided wherein a user of an interconnected computer system can identify a specific piece of data and then access this data from another computer in the network. It is often desirable for data to be capable of being displayed and manipulated from another system during meetings, discussions and the like. The user who wishes to transfer a file to another system simply points an untethered stylus to a representation of a file, such as a filename, icon, or the like and then selects the file to be transferred. The user then carries the stylus to a remote interconnected computer and points the stylus at the remote computer which verifies the identity of the stylus and obtains a path to the selected file. The data file is then transferred from the user's computer to the remote computer through the network.

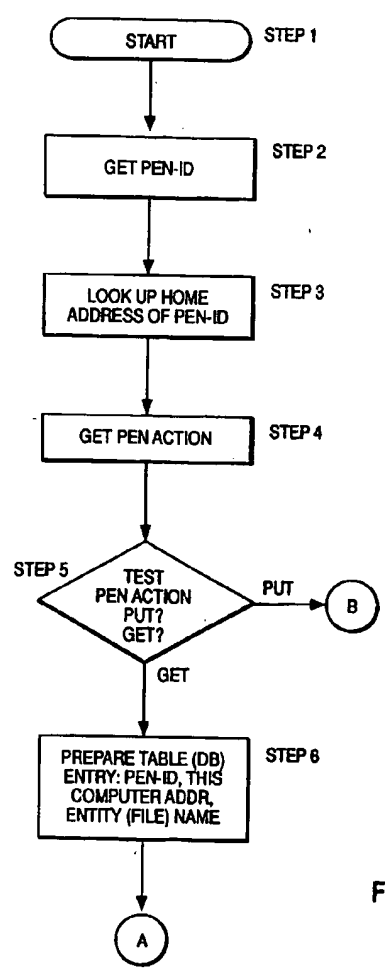


FIG. 7A

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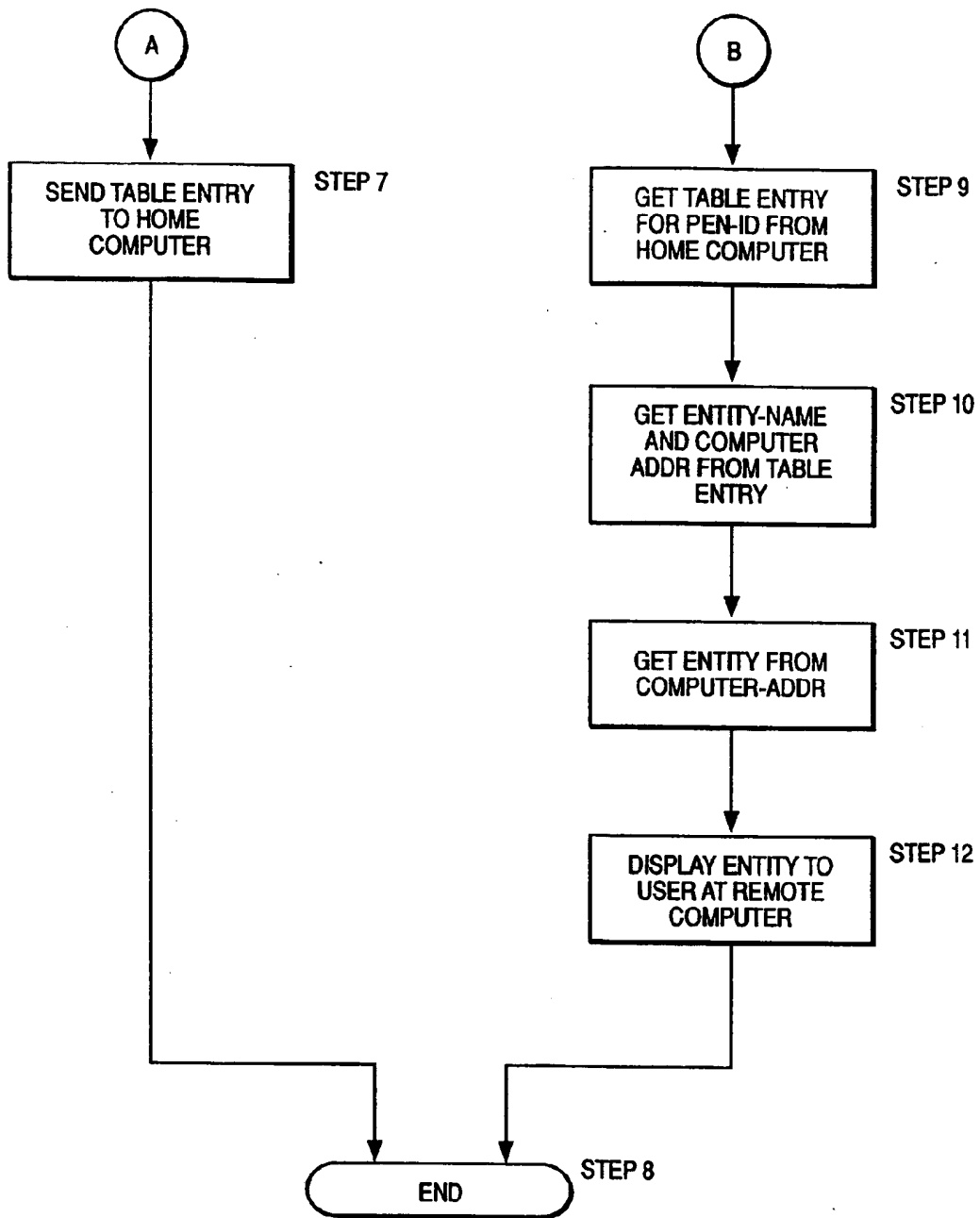


FIG. 7B

Field of the Invention

The present invention generally relates to transferring data between interconnected computer systems. More particularly, a stylus is used to select data in a first computer and then causes the selected data to be transferred to an interconnected remote computer by identifying itself as the data owner to the remote computer. Also, the stylus can be used to select a program running on the first computer such that the selected program can be accessed, by using a terminal type link, from the remote computer.

Background Art

Typically, in transferring data between interconnected data processing systems a user will execute transmit/receive commands on the appropriate computers, or establish a shared disk between them. However, these methods require the user to specify a large amount of information and to foresee and identify all possible destinations that may need to receive the data.

Additionally, it is currently possible to move data from one system to another via floppy disks, but they are slow, relatively bulky and limited in the amount of data that can be transferred.

However, none of the conventional methods of transferring data between interconnected systems contemplate the use of an untethered stylus to identify and initiate the transmission of data. U.S. patent no. 4,686,332 describes a finger touch and stylus detection system for use on a visual display for entering commands to a system. Further, U.S. 5,007,085 also describes a stylus as peripheral device in an interconnected system. An input system on a computer within the interconnected system includes stored program instructions which control detection and log-on procedures for a stylus that is sensed by a remote computer system.

Although, it can be seen that use of a stylus in a network of interconnected data processors is known, there is no provision for conveniently transferring data between interconnected systems based on information input from an untethered stylus such that data appears to have been transferred by the user's stylus, when the user inputs data on a remote computer.

DISCLOSURE OF THE INVENTION

Accordingly the invention provides a method of transferring data between interconnected data processing systems, comprising the steps of providing input means for identifying transferable data, and for selecting transferable data at a first one of said data processing systems, verifying, at a remote data processing system, an association between said input

means and said transferable data, and transferring said transferable data from said first data processing system to said remote data processing system. The invention also provides a system for transferring data between interconnected data processing systems, comprising input means for identifying transferable data, and for selecting said transferable data at a first one of said data processing systems, means for verifying, at a remote data processing system, an association between said input means and said transferable data, and means for transferring said transferable data from said first data processing system to said remote data processing system. The invention also provides a method of linking a program running on a first interconnected data processing system with a remote interconnected data processing system, comprising the steps of providing input means for identifying the running program, and for selecting said running program at said first one of said data processing systems, verifying, at a remote data processing system, an association between said input means and said running program linking said running program from said first data processing system to said remote data processing system such that a user may interact with said running program from said remote data processing system.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will now be described, by way of example only, with reference to the accompanying drawings, in which:

Figure 1 is a schematic diagram of a data processing system for connection to a network for use with the present invention;

Figure 2 shows a network of interconnected computer systems;

Figure 3 is a display screen of a user's computer system during selection of a file to be transferred using the present invention;

Figure 4 is a display screen of a remote interconnected computer system before the selected file has been transferred thereto;

Figure 5 is the display screen of the remote interconnected computer system after the user has implemented transfer of the selected file from the user's home computer;

Figure 6 shows the display screens of the user's home computer and the display screens of two remote interconnected computer systems to illustrate the use of the present invention on plural remote systems; and

Figures 7A and 7B are flowcharts illustrating the method by which the present invention transfers data from one interconnected computer to another using an untethered stylus.

DETAILED DESCRIPTION OF THE INVENTION

Referring to Figure 1, a typical data processing system is shown which may be used in conjunction with the present invention. The central processing unit (CPU) 10, may be one of the Intel X86 processors and is provided and interconnected to the various other components by system bus 12. Read only memory (ROM) 16 is connected to CPU 10 via bus 12 and includes the basic input/output system (BIOS) that controls the basic computer functions. Random access memory (RAM) 14, I/O adapter 18 and communications adapter 34 are also interconnected to system bus 12. I/O adapter 18 may be a small computer system interface (SCSI) adapter that communicates with a disk storage device 20. Communications adapter 34 interconnects bus 12 with outside networks enabling the data processing system to communicate with other such systems. Input/output devices are also connected to system bus 12 via user interface adapter 22 and display adapter 36. Keyboard 24, track ball 32, mouse 26 and speaker 28 are all interconnected to bus 12 via user interface adapter 22. Display monitor 38 is connected to system bus 12 by display adapter 36. An untethered stylus 40 is also shown which will allow a user to interact with the system shown in Figure 1, through display 38. A stylus receiver/detector 39 is also shown which is essentially a matrix of electrical conductors (for detecting electromagnetic fields) embedded in a transparent membrane and placed over the screen (CRT) of display 38. The means by which stylus 40 interacts with display 38 is well known in the art as previously described in U.S. Patent Numbers 4,686,332 and 5,007,085. In this manner, a user is capable of inputting data to the system through the keyboard 24, track ball 32, mouse 26 or stylus 40 and receiving output from the system via speaker 28 and display 38. Additionally, an operating system such as DOS or the OS/2 system (OS/2 is a Trademark of the IBM Corporation) is used to coordinate the functions of various components shown in Figure 1. It should be noted that a stylus, or pen, is described herein merely as an example of one type of device that can be used in conjunction with the present invention. Any other untethered devices or means that are capable of identifying a user to a computer, such as computer recognizable optical or audio commands (including tones and voice) are also contemplated by the present invention.

Figure 2 shows a plurality of interconnected data processing systems 50. These systems may include personal computers such as the IBM PS/2, or workstations such as the IBM RISC System/6000 (PS/2 and RISC System/6000 are Trademarks of IBM Corporation) or the like. Reference numeral 50 represents a hardware platform having components such as those illustrated in Figure 1. A bus 54, or the like interconnect each of the plurality of systems 50 such

that a network of data processing systems is provided. Each system 50 will include a communications interface 52 which is a communications protocol program, such as TCP/IP, that is effectively a communications program device driver for each individual system shown in Figure 2. It should be noted that many connection schemes are known in the art and the present invention is not dependent upon a particular type of network system, but may be implemented on any system with interconnected data processing system capable of communicating with one another. The previous description of a typical system is provided as an example only, and should not be considered a limitation or requirement of the present invention.

Figure 3 is a screen from display 38 which shows computer program 65 (running in a window), two icons 60 and 70 as well as stylus 40. It should be noted that in Figures 3 to 6 the stylus 40 is actually displayed from the screen, but close enough for the system to detect its presence. Icons 60 and 70 represent objects which are programs in object oriented format. For example, icon 70 is a printer function program, or printer device driver to control the printing operations of the data processing system. Similarly, icon 60 may be a word processing program application or a document stored in the word processing application. It should be noted that object oriented programming is well known in the art and extensively used in computer programs such as OS/2 and WINDOWS (WINDOWS is a Trademark of Microsoft Corporation). Generally, these objects are selected either by keyboard strokes or by clicking on the icon with a mouse. Similarly a user interacts with active program 65 (which may be a word processing program, game, or the like) by using the keyboard and/or a mouse, depending upon the capabilities of the program. Of course, input means such as a stylus 40 can also be used to select an icon representative of an object oriented program as contemplated by the present invention.

In order to implement the present invention, the interconnected computer system must be able to uniquely identify each stylus 40 in order to link the stylus, or pen, with selected data, or a running program. Stylus 40 can be modified such that it contains a unique identification code which is emitted when it is brought near the display. Again, in a system used as an example of the present invention, the stylus is battery powered and transmits an electromagnetic field when enabled, which occurs when the stylus is brought in close proximity to the computer screen. A matrix of wires and control logic is contained in a transparent film placed over the computer screen that allows actions of the stylus to be monitored by detecting the electromagnetic field emitted by the stylus when enabled. When a user selects a data unit, such as icon 60 (representing an object oriented program) or a running program, the computer system records

an association between the stylus identification code and the particular entity. It should be noted that "entity" as used herein will include both data units (files or data files) as well as active (running) programs, e.g. programs 60, 65 and inactive program 70. In this manner, if the stylus identification code is then detected at another remotely interconnected computer system the data is transferred through the network to the other computer.

Additionally, if a running program is selected at a home computer and the stylus identification code is then detected at the remote computer, a "link" is established from the remote computer to a program running on the home computer. It should be noted that remote terminals are known in the art, however an embodiment of the present invention is utilized to establish this link between remote computer systems. This link will allow a user to input commands, for example keystrokes, mouse clicks, to the running program from the remote system, and also to receive display output from the running program. In this manner, a user can remotely interact with a computer program running on the user's home computer, through the link established by the system of the present invention. One advantage of providing this linking capability is to allow a user to run a program on the home computer so that the initialization time required to start the program will be unnecessary from the remote location. For example, a word processing program can be running with a particular document being edited such that the user can immediately access the program and the document, without having to initialize the program and select the document. In other words, the user can leave a program running with work in progress at one computer and access the program (work), from another interconnected system, at the point where the user left it. Further, establishing a link eliminates any need to transfer the program from the home computer to the remote computer when its use is desired. Those skilled in the art will understand that the same path between interconnected home and remote computers, used to transfer data, can be used to establish the linking feature of the present invention. It should be understood that a user must select a program prior to leaving the home system, and leave the selected program running at the home computer, in order to interact with the program via the link.

It is possible to establish a connection between all the computers in the network such that upon detection of the stylus identification code and a data unit selection, at any one of the network computers, the system containing the data unit would distribute the data or its address to all systems interconnected on the network. This solution may be somewhat impractical in large networks, however storing associations on a server system may be acceptable.

In a preferred embodiment of the present inven-

tion each stylus will be associated with a "home-base" computer. The emitted identification code from the stylus would include a path to home-base. This path can be implemented either directly in the identification code or through the use of a look-up table, or the like. All of the associations between the stylus id code and data unit association will be listed on the home-base computer.

Returning to Figure 3, an example of the operation of the present invention will now be provided, wherein computer A is considered to be the home-base computer for stylus 40. An identification code (stylus identification, or SID) is associated with stylus 40. The user then selects an entity from home-base computer A. In this example, object 60 is selected by the user. It can be seen that object 60 may be a document, or other program that a user has created on the home-base computer and now wishes to transfer to another system for purposes of discussion, meeting, revisions, or the like. Subsequent to selection of object 60 by the user, computer A makes a data base entry in a table, or the like, that includes the stylus identification code, the address where object 60 is located, and the name of object 60. The user then physically carries stylus 40 to another computer B on the network. It should be noted that this computer can be across the room or across the country, as long as the computers are interconnected and contain the same communication protocol, as previously discussed.

Figure 4 represents a computer, for example computer B, that is interconnected to computer A. Computer B includes objects 70 and 80, but not object 60, since Figure 4 represents the state of computer B prior to implementation of a data transfer as contemplated by the present invention. The user places stylus 40 in close proximity to screen 38 and receiver 39 of computer B such that the stylus is enabled. Computer B then recognizes the stylus identification code as valid and looks up the home-base computer for the stylus corresponding to the identification code. Computer B will find that home-base for stylus 40 is computer A. Computer B then asks computer A for the table entry created for the stylus 40. Computer A will then send the stylus entry to computer B and include the name (filename) of the entity (the data unit) and its address. In this case, computer B will ask computer A for object 60, which is then transmitted through computer B for display on screen 38 thereof.

In this manner, object 60 is now displayed on screen 38 of computer B, as shown in Figure 5. Thus, data is transferred from one computer to another through a network by use of a stylus identification code and a table entry that includes the address for the object to be transmitted, the stylus identification, and the object name. It will appear to the user that the present invention is a variation of the "drag and drop" concept which has been extended to work between separate computer systems rather than merely move

objects across the screen of a single system. The user will select the object to be moved (or transmitted to a separate computer and then physically carry the stylus, to another interconnected system. The user then points the stylus to a space on the screen of the second computer and "drops" the data. The data is then transferred through the network to the second computer, but appears to a user to have been dropped by the stylus 40. Thus it will appear to the user that the data is dragged from one computer to a remote interconnected computer and then dropped thereon.

Also, in accordance with the present invention, the user may select program 65, or task, such as a word processing program, or the like, running on computer A. The user can then carry the stylus to remote computer B and identify the stylus to computer B. Similar to the transfer of data, computer B will determine that computer A is home-base for this stylus and ask computer A for the table entry created for this program. The table entry will be sent by computer A to computer B and will include the program name and address. Thus, a link is established from computer B to the program (task) running at computer A such that a remote user is capable of interacting with the program.

Again referring to Figures 3 to 5, an alternate use of the present invention will be described. For example, again assume that computer A is the home-base system for the stylus. The user is currently working on computer B and desires to transfer a printer driver 70 in object form to computer A by use of stylus 40. The user "gets", or selects, printer driver 70 on computer B which then looks up the home-base computer for the stylus 40. Computer B then finds that computer A is the home-base and sends a table entry that includes the stylus identification code, an entity address at computer B, and entity filename to computer A. The user then returns with stylus 40 to the home-base computer A. The stylus is then enabled such that the user asks for the entity (object 70) to be "put" into computer A. This time computer A looks up the address of the stylus identification code and finds that it (computer A) is the home-base computer for this particular stylus, i.e. address is equal to computer A. The table entry for the stylus identification code 40 is then obtained from computer B along with the entity name. Subsequently, computer A asks computer B for the entity, in this case printer driver 70, which is then displayed on computer A. Thus, it can be seen how the present invention allows data to be selected on a home-base computer such that it can be transferred to other interconnected computers in the system, and data can be selected on a remote interconnected system for transfer back to the home-base computer, as desired by a user. Additionally, a user can establish a link from the home computer to the remote computer by: initiating a program at the remote location; selecting the running program; and identify-

ing the stylus to the home computer. This will establish the link back to the program running on the remote computer. For example, program 65 is running on computer B and by use of the present invention a user can access and interact with program 65 from computer A by establishing a link back to computer B using the method described above.

Another use of the present invention will now be described with reference to Figure 6. Again, computer A is shown with objects 60 and 70 displayed on screen thereof. Computer B is interconnected to computer A by network 54 and includes objects 60 and 70 along with a data base, or file program represented by icon 80. Objects 60, 70 and 80 are displayed on screen 38 of computer B. Another interconnected computer C is shown having object 80 displayed on screen 38 thereof. Again, the home-base computer for stylus 40 is computer system A. In this example, the user is physically located at computer system B and selects object 80 (the data base or file program) displayed in object oriented format on screen 38 of computer B. The stylus identification code is validated by computer B which also looks up the address of the stylus and sees that computer A is the home-base system for this particular stylus. Computer B then sends the table entry including the stylus identification code, computer B as the address of the program represented by icon 80 and the name of the program to computer A. The user then physically carries the stylus 40 to computer C which is another interconnected computer on the system. Stylus 40 is enabled and the user seeks to "put" the program represented by icon 80 onto computer C. Upon enablement of stylus 40, computer C looks up the address associated with the identification code for stylus 40. Computer C then determines that computer A is the home-base computer for this particular stylus and asks computer A for the table entry (previously sent by computer B) associated with this stylus identification code. Computer C then obtains the table entry for the stylus identification and determines that the address of the program is at computer B and also determines the program name for the object oriented program represented by icon 80. Computer C then asks computer B for the program using the filename of the program from the table entry and displays the program represented by icon 80 subsequent to transfer of the data from computer B to computer C. Again, it should be understood that a user can run a program on any one of the interconnected computer systems and establish a link back to that program, or task, from any other of the interconnected computer systems by using the method previously described with reference to the transfer of data between systems, that is identifying identifying the stylus and its home-base computer and accessing the look up table entry to obtain the address for the entity. More particularly, game program 63 is left running on computer C and a link can

be established from computer A that will allow a user to interact with game 63 on computer C.

Therefore, it can be seen how a stylus can be associated with a particular home-base computer and a user may work between several remote interconnected systems (which are not home-base for the stylus) and transfer data between remote computers as well as a remote computer and the home-base computer or vice-versa. In this manner, a great deal of flexibility is provided as a user travels or needs to share various programs with other interconnected users.

Figures 7A and B are flowcharts that represent the process by which the stylus 40, or pen can be used to implement the transfer of data among various interconnected computer systems. At step 1 the process is started, and at step 2 the identification code for a particular stylus is obtained by the computer system at which the user is currently pointing the stylus. The address of the home-base computer associated with the particular pen identification, is then looked up from a table, or the like at step 3. The computer at which the user is currently working (and where the pen is enabled) receives (gets) the pen action at step 4. It is then determined at step 5 what type of pen action is desired by the user. For example, a certain code will be present if the user desires to select (or get) a particular object (data or program), whereas another code will be present (or the get code will be absent) when the user desires to put a particular object onto the computer system at which the user is currently working. If the user is selecting an object for potential future transfer to a remote system, or a link to a running program, the process continues to step 6 where a table entry is prepared which includes data relating to the pen identification code, the computer address for the system at which the user is currently selecting (getting) the program, and the filename of the data, or the name of the program (entity name) that has been selected by the user. Subsequent to preparation of the table entry, the computer at which the user is working sends the table entry to the home-base computer that is associated with the particular stylus (step 7). Subsequent to step 7, the get function is completed and the process ends at step 8. Returning to step 5, if the user currently wishes to place (or put) a previously selected data unit or program link onto the system at which the user is currently working, the table entry previously prepared when the data unit or program was selected is obtained (step 9) from the home-base computer using the associated pen id code (recognized by the computer system at which the user is working). Subsequent to obtaining the table entry, the computer at which a user desires to display the data unit or program obtains the entity name and the computer address at which this particular entity resides from the table entry received from the home-base computer (step 10). Once the filename and address for the desired unit is obtained, the

entity is then transferred from the computer, at which the program resides, to the computer where the user desires the information to be displayed (step 11). Once obtained, the data unit is then displayed (step 12) at the remote computer, designated by the user. It should be noted that the data unit displayed on the remote computer may be capable of being manipulated by the user from the remote site and not merely displayed. If a user desires to link to an running program, the link is established (step 11) and the display output from the running program is displayed at step 12 such that a user can interact with the program. Subsequent to display of the data unit or linked program at the remote computer, the process continues to step 8 and ends. Therefore, it can be seen that the present invention contemplates a system wherein each user may have a uniquely identified stylus that is associated with a home-base computer. Various table entries can then be created for programs, or the like such that a path, through the home-base computer, can be created and a stylus with a particular identification can access any previously selected data unit through the home-base computer and the table entry.

Claims

1. A method of transferring data between interconnected data processing systems (50), comprising the steps of:
 - providing input means (40) for identifying transferable data, and for selecting transferable data at a first one of said data processing systems (50);
 - verifying, at a second one of said data processing systems (50), an association between said input means (40) and said transferable data; and
 - transferring said transferable data from said first data processing system (50) to said second data processing system (50).
2. A method as claimed in claim 1, further comprising the step of associating a unique identification code with said input means (40) indicating the correspondence of said input means (40) with said first data processing system (50).
3. A method as claimed in claim 2 wherein said step of selecting transferable data comprises the step of creating a table entry including the unique identification code, the associated data processing system and a name of said selected transferable data.
4. A method as claimed in claim 3 wherein said step of verifying comprises the steps of:

- identifying said input means (40) and the associated data processing system (50) using said unique identification code;
 obtaining said table entry from said first data processing system (50); and
 determining the location of said selected transferable data.
5. A method as claimed in any preceding claim further comprising the step of displaying said transferable data on said second data processing system (50).
6. A system for transferring data between interconnected data processing systems (50), comprising:
 input means (50) for identifying transferable data, and for selecting said transferable data at a first one of said data processing systems (50);
 means for verifying, at a second one of said data processing systems (50), an association between said input means (40) and said transferable data; and
 means for transferring said transferable data from said first data processing system (50) to said second data processing system.
7. A system as claimed in claim 6, further comprising means for associating a unique identification code with said input means (40) indicating the correspondence of said input means (40) with said first data processing system (50).
8. A system as claimed in claim 7 wherein said means for selecting transferable data comprises means for creating a table entry including the unique identification code, the associated data processing system and a name of said transferable selected data.
9. A system as claimed in claim 8 wherein said means for verifying comprises:
 means for identifying said input means (40) and the associated data processing system (50) using said unique identification code;
 means for obtaining said database entry from said first data processing system (50); and
 means for determining the location of said selected transferable data.
10. A system as claimed in claim 9 further comprising means for displaying said transferable data on said second data processing system (50).
11. A system as claimed in claim 10 wherein said input means (40) is an untethered stylus.
12. A system as claimed in claim 11 wherein said transferable data is an object oriented computer program or data file.
13. A method of linking a program (65) running on a first interconnected data processing system (50) with a second interconnected data processing system (50), comprising the steps of:
 providing input means (40) for identifying the running program (65), and for selecting said running program at said first one of said data processing systems (50);
 verifying, at a second data processing system, an association between said input means and said running program; and
 linking said running program (65) from said first data processing system (50) to said second data processing system such that a user may interact with said running program from said second data processing system.
14. A method as claimed in claim 13, further comprising the step of associating a unique identification code with said input means (40) indicating the correspondence of said input means (40) with said first data processing system (50).
15. A method as claimed in claim 14 wherein said step of selecting comprises the step of creating a table entry including the unique identification code, the associated data processing system and a name of said program.
16. A method as claimed in claim 15 wherein said step of verifying comprises the steps of:
 identifying said input means (40) and the associated data processing system (50) using said unique identification code;
 obtaining said table entry from said first data processing system (50); and
 determining the location of said running program (65).
17. A method as claimed in claim 16 further comprising the step of displaying output from said running program on said second data processing system.

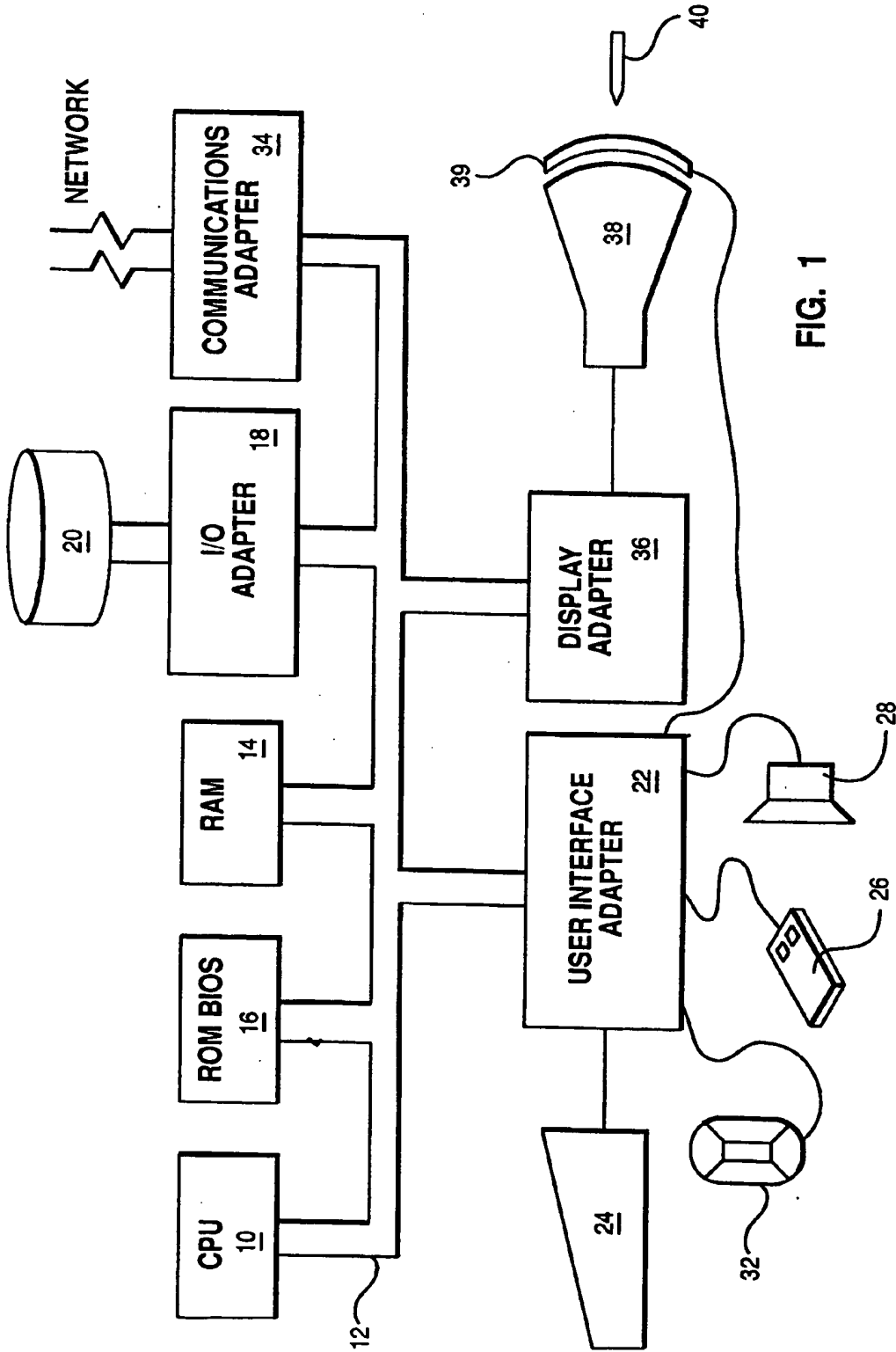


FIG. 1

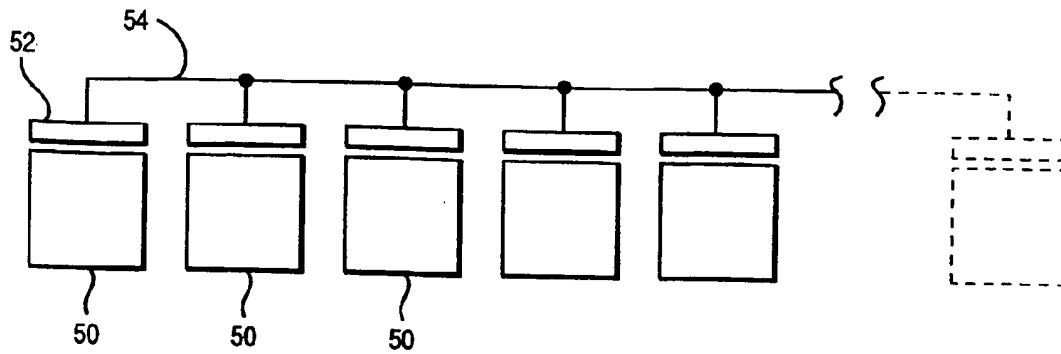


FIG. 2

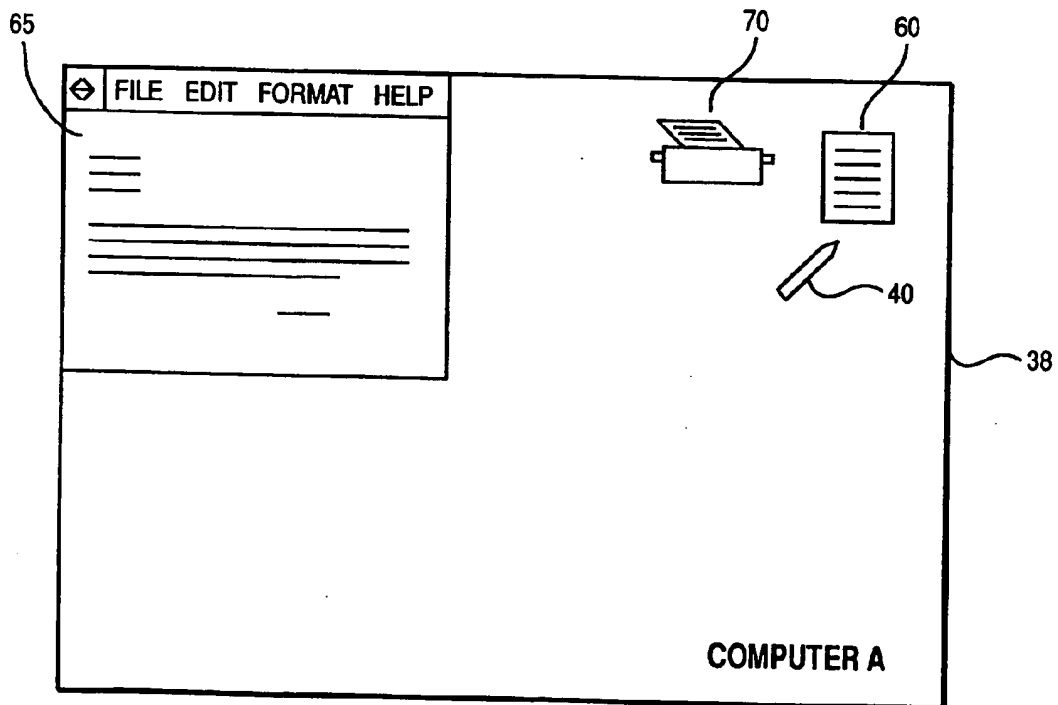


FIG. 3

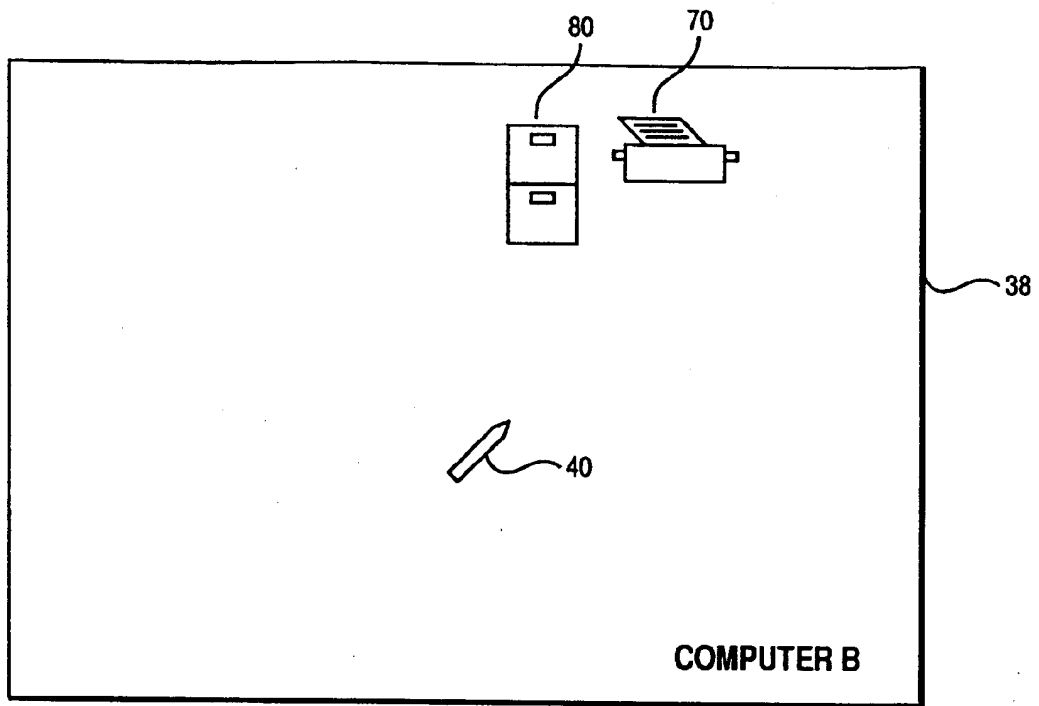


FIG. 4

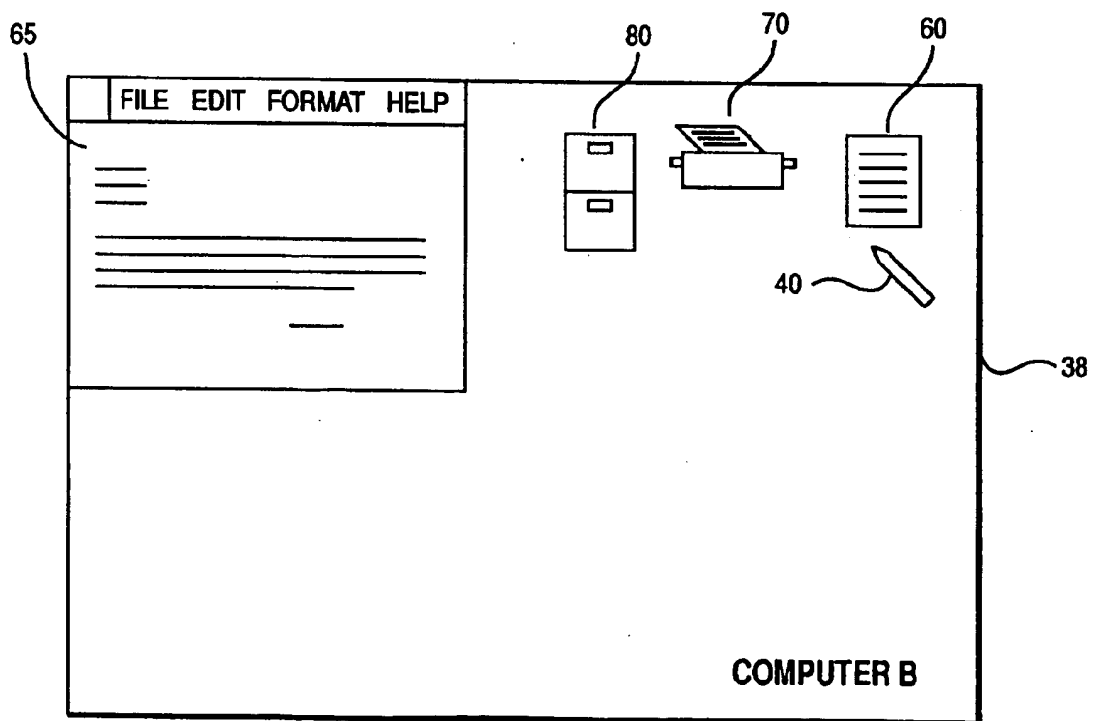


FIG. 5

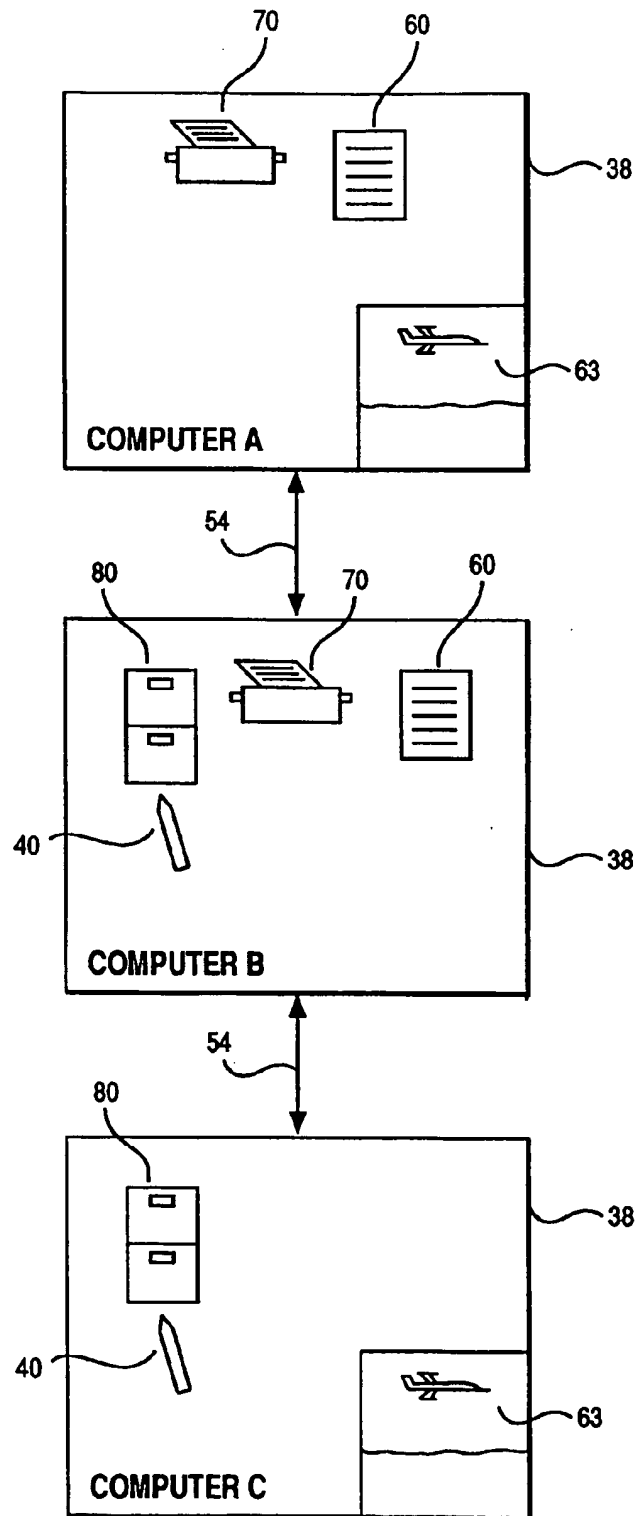


FIG. 6

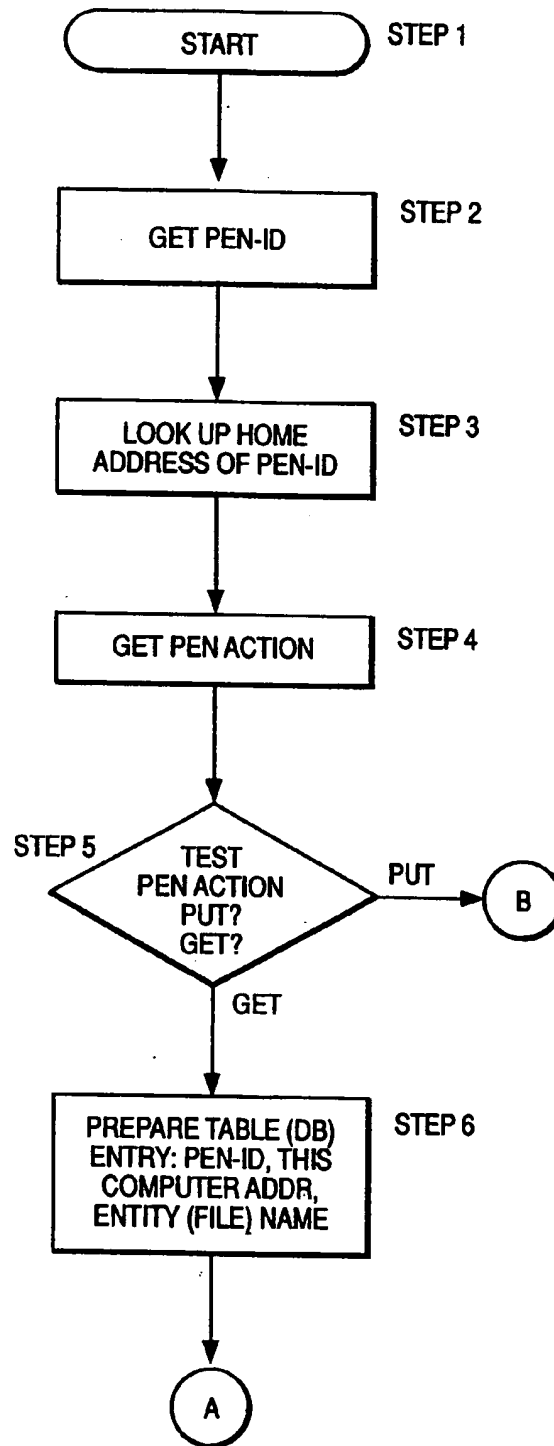


FIG. 7A

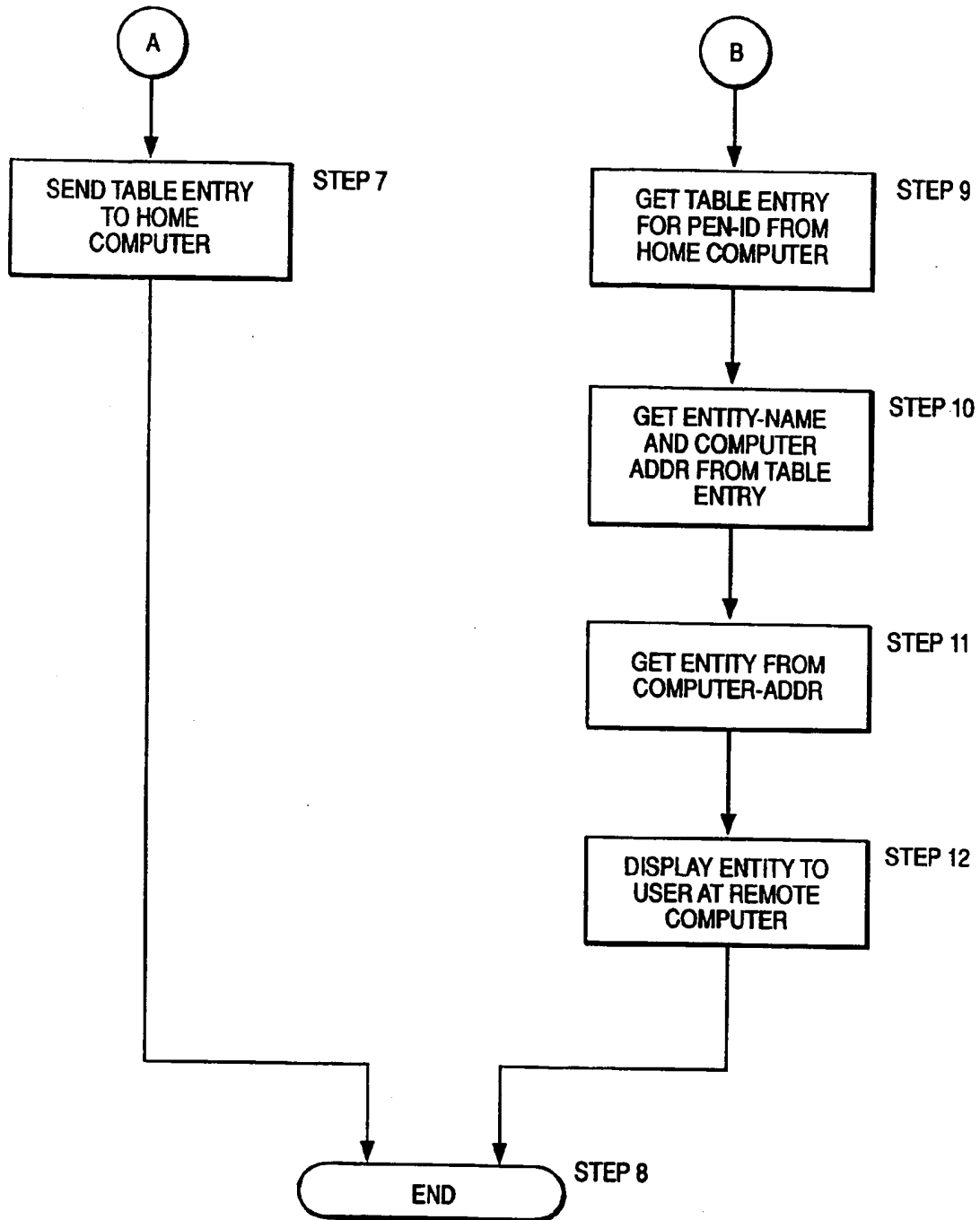


FIG. 7B



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number

EP 93 30 5991

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claims	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
A	EP-A-0 262 991 (INTERAND CORP.) * column 5, line 23 - line 34 * * column 7, line 29 - line 40 * * column 13, line 61 - column 14, line 25; figures 1,2 * ---	1,6,13	G06F3/033 G06F15/16
A	EP-A-0 365 918 (IBM) * the whole document *	1,6,13	
D	& US-A-5 007 085 ---		
A	PATENT ABSTRACTS OF JAPAN vol. 15, no. 103 (P-1178)12 March 1991 & JP-A-23 10 718 (HUDSON SOFT CO LTD) 26 December 1990 * abstract * ---	1,6,13	
A	IBM TECHNICAL DISCLOSURE BULLETIN. vol. 34, no. 2, July 1991, NEW YORK US pages 406 - 409 'Automatic stylus identification system' * the whole document * -----	1,6,13	
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			G06F
The present search report has been drawn up for all claims			
Place of search BERLIN		Date of completion of the search 25 OCTOBER 1993	Examiner DURAND J.
CATEGORY OF CITED DOCUMENTS		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons A : member of the same patent family, corresponding document	
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document			

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